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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,141	04/21/2004	James C. Kim	LUM-03-06-06	5434

32566 7590 08/08/2005

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EXAMINER	
NGUYEN, JOSEPH H	
ART UNIT	**PAPER NUMBER**
2815	

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/829,141	KIM ET AL.	
	Examiner	Art Unit	
	Joseph Nguyen	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-23* is/are rejected.

7)☒ Claim(s) *6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 04/04
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-14 and 18-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "a composition of indium in the light emitting layer" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. The material of the light emitting layer in claim 1 from which claim 8 depends is not purported to comprise indium, and therefore it is not understood how the light emitting layer contains indium in claim 8.

Claims 9-10 are also rejected due to their dependency upon the rejected base claim 8.

Claims 11 and 12 recite the limitation "a composition of aluminum in the light emitting layer" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. The material of the light-emitting layer in claim 1 from which claims 11 and 12 depend is not purported to comprise aluminum, and therefore it is not understood how the light-emitting layer contains aluminum indium in claims 11 and 12.

Claims 13-14 are also rejected due to their dependency upon the rejected base claim 12.

Claims 18-20 recite the limitation "first and second cladding layers" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. First and second cladding layers were not previously referred to in claim 15 from which claims 18-20 depend.

Claim 21 recites the limitation "a composition of indium in the light emitting layer" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. The material of the light emitting layer in claim 20 from which claim 21 depends is purported to comprise indium, and therefore it is not understood how the light emitting layer contains indium in claim 8.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 15, 18-19 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hata et al. (US 2003/0057434 A1) in view of Sun et al. ("Polarization anisotropy of the photoluminescence of M-plane).

Regarding claim 1, Hata et al. disclose in figure 4 a semiconductor light emitting device comprising a light emitting layer 5A (para [0079], line 2) disposed between an n type region 4 (para [0078], line 8) and a p type region 6 (para [0080], line 2) wherein the light emitting layer is wurzite (para [0119]) and the light emitting layer has a thickness

greater tan 25A (para [009]). Note that the device constituting layer comprising the light emitting layer is a wurzite structure, and therefore the light emitting layer is also wurzite. Hata et al. does not disclose a <0001> axis being substantially parallel to a top surface of the light-emitting layer. Applicant teaches in para [0011] the light emitting layer that has a top surface substantially parallel to <0001> axis is <1120> layer. Sun et al. teaches in page 3850, right column, lines 9-17 the light emitting layer is <1120> layer. Therefore, Sun et al. discloses a <0001> axis being substantially parallel to a top surface of the light-emitting layer. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hata et al. by having a <0001> axis being substantially parallel to a top surface of the light emitting layer to increase the polarization degree in a light emitting layer (page 3850, right column, line 1-2).

Regarding claims 2-4, Hata et al. discloses in para [0079], lines 2-7 the light-emitting layer has a thickness greater than 50A, 90A and 150A. Note that Hata et al. discloses the light emitting layer 5A has a plurality of barrier layers and well layers, each having a thickness of 5nm (50A). Therefore, the total thickness of the light-emitting layer is greater than 50A, 90A and 150A.

Regarding claim 5, Sun et al. discloses the light-emitting layer comprises <1120>.

Regarding claim 15, Hata et al. discloses in para [0079] the light emitting layer 5A is a first quantum well and further comprises a second quantum well and a barrier

layer disposed between the first and second quantum well; wherein the first quantum well, second quantum well and barrier form an active region.

Regarding claim 18, Hata et al. discloses in figure 4 the active region 5A is disposed between first and second cladding layers 4, 6.

Regarding claim 19, it is inherent the bandgap of the first and second cladding layers is larger than that of the first and second quantum wells so that holes and electrons can recombine in the active region and emit light.

Regarding claims 22-23, the light emitting device of Hata et al. and Sun et al. comprise a similar structure as that of the claimed light emitting device and therefore is capable of performing as claimed.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hata et al. and Sun et al., and further in view of Goetz et al. (US 2002/0171092 A1).

Regarding claim 7, Hata et al. and Sun et al. disclose the light emitting layer 5A comprising GaInN (para [0079], lines 2-7), not AlInGaN as claimed. However, Goetz et al. discloses the light-emitting layer can be formed of GaInN or AlInGaN (para [0022], lines 3-6). In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hata et al. and Sun et al. by having the light emitting layer comprising AlInGaN because GaInN and AlInGaN are recognized in the art as equivalents.

Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hata et al. and Sun et al., and further in view of Ibbetson et al. (US 6,515,313).

Regarding claim 8, Hata et al. and Sun et al. disclose substantially all the structure set forth in the claimed invention except the light emitting layer being graded from a first indium composition in a first portion of the light emitting layer proximate the n type region to a second indium composition in a second portion of the light emitting layer proximate the p type region. However, Ibbetson et al. discloses in (col. 10, lines 31-43) the light emitting layer being graded from a first indium composition in a first portion of the light emitting layer proximate the n type region to a second indium composition in a second portion of the light emitting layer proximate the p type region. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hata et al. and Sun et al. by having the light emitting layer being graded from a first indium composition in a first portion of the light emitting layer proximate the n type region to a second indium composition in a second portion of the light emitting layer proximate the p type region to increase emission efficiency (col. 10, line 45).

Regarding claims 9-10, It would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Hata et al. and Sun et al. and Ibbetson et al. by having the first composition greater (claim 9) or less (claim 10) than the second composition, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 11-14 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hata et al. and Sun et al., and further in view of Bour et al.

Regarding claims 11 and 12, Hata et al. and Sun et al. disclose substantially all the structure set forth in the claimed invention except the light emitting layer being graded from a first aluminum composition in a first portion of the light emitting layer proximate the n type region to a second aluminum composition in a second portion of the light emitting layer proximate the p type region. However, Bour et al. discloses in para [0046] the light emitting layer being graded from a first aluminum composition in a first portion of the light emitting layer proximate the n type region to a second aluminum composition in a second portion of the light emitting layer proximate the p type region. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hata et al. and Sun et al. by having the light emitting layer being graded from a first aluminum composition in a first portion of the light emitting layer proximate the n type region to a second aluminum composition in a second portion of the light emitting layer proximate the p type region to improve the light output of the active region in light emitting device (para [0001], Bour et al.).

Regarding claims 13-14, It would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Hata et al. and Sun et al. by having the first composition greater (claim 13) or less (claim 14) than the second composition, since it has been held that discovering an optimum value of a result

effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 16, Hata et al. and Sun et al. disclose substantially all the structure set forth in the claimed invention except an indium composition in one of the first and second quantum wells being graded. However, Bour et al. discloses in para [0027] an indium composition in one of the first and second quantum wells being graded. In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hata et al. and Sun et al. by having an indium composition in one of the first and second quantum wells being graded to improve the light output of the active region in light emitting device (para [0001], Bour et al.).

Regarding claim 17, Bour et al. discloses in para [0011] the barrier layer has a graded composition.

Allowable Subject Matter

Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The reference (s) of record do not teach or suggest, either singularly or in combination at least the limitation of "the light emitting layer comprises {101$\bar{0}$}" for claim 6.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (571) 272-1734. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300 for regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JN
August 4, 2005

JEROME JACKSON
PRIMARY EXAMINER